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ROYALTY EVALUATION PROCEDURE

OF THE

PROTOTYPE OIL SHALE LEASES

OIL SHALE OFFICE
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Geological Survey, Conservation Division

Oil Shale Office

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ROYALTY EVALUATION PROCEDURE

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PROTOTYPE OIL SHALE LEASES

U. S. Geological Survey
Conservation Division
Area Oil Shale Supervisor's Office
131 N. 6th, Suite 300
Grand Junction, Colorado 81501

ABSTRACT

The method of computing the royalty for the prototype oil shale lease tracts is dependent on whether the oil shale is processed by an in situ method or whether the oil shale is mined and then retorted above ground.

If the oil shale is mined and processed or sold, the basic royalty rate is equal to twelve cents a ton for an oil content of thirty gallons per ton. Royalty is adjusted by the oil content and ratio of the combined average value per barrel of all crude oil and crude shale oil produced in the states of Colorado, Utah, and Wyoming for the preceeding year and base year. The base price is the average crude oil price of the three state area in 1974 when the leases were signed.

If the oil shale is processed by in situ methods, the basic royalty rate is equal to twelve cents per equivalent ton. Equivalent tons are based on the total gross heat of combustion in BTU's of all oil and gas products at the wellhead or shaft openings. The royalty is only adjusted by the variance of crude oil prices, but not shale oil grade because the equivalent tons are calculated on a shale oil content of thirty gallons per ton.

The lease requires an additional royalty for all minerals other than oil shale contained in oil shale produced from the leased deposit. This royalty is to be computed on a percentage of the gross value of the other minerals at the point of shipment to market.

To expedite the development of the lease tracts, there is a minimum royalty required of the lessees. This royalty can be offset with expenditures which are directly attributable to operations for the development of the lease deposits through the tenth lease year.

INTRODUCTION

Of all the hydrocarbon resources in the world, the most abundant single resource in one area is the oil shale deposit contained in the Green River Formation in the three-state area of Colorado, Utah, and Wyoming. It is estimated to contain more than 2.4 trillion barrels of oil equivalent of which 1.8 trillion barrels are classed as identified resources.[1/] When the organic matter (called kerogen) in oil shale is heated to 800 to 900° F, the kerogen will decompose into shale oil, carbonaceous residue, and gas.

In 1974, the U. S. Department of Interior leased four 5,000-acre tracts for commercial oil shale development under the Prototype Oil Shale Program. The program was designed to provide a new energy source, to protect the environment of the prototype areas, to permit a fair return to all, and to develop expertise in oil shale management and technology.

Federal oil shale lease tracts C-a (Rio Blanco Oil Shale Company) and C-b (Cathedral Bluffs Shale Oil Company) are in the Piceance Basin of northwestern Colorado; tracts U-a and U-b (White River Shale Project) are in the adjoining Uinta Basin of eastern Utah (Fig. 1). Present plans call for development of the Colorado tract C-b by the modified in situ retorting processes, Colorado tract C-a by combined modified in situ and aboveground

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1/ United States Mineral Resources, 1973, Geological Survey Professional Paper 820, p. 500.

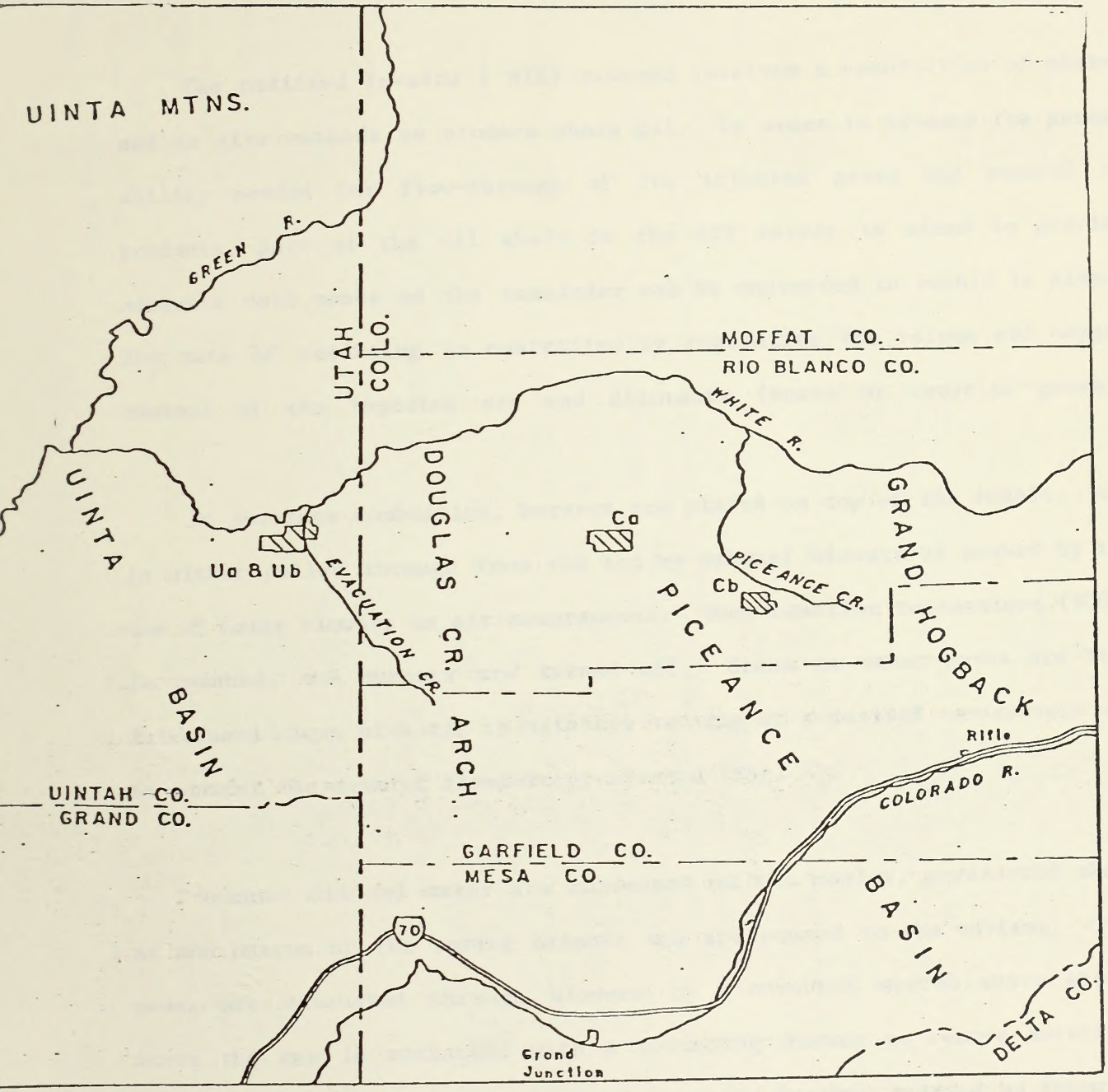


Figure 1.--Location of prototype oil-shale lease tracts C-a, C-b, U-a and U-b.

retorting, and for development of the two Utah tracts by room-and-pillar mining with above-ground retorting.

The modified in-situ (MIS) process involves a combination of mining and in situ methods to produce shale oil. In order to produce the permeability needed for flow-through of the injected gases and removal of products, part of the oil shale in the MIS retort is mined to provide adequate void space so the remainder can be converted to rubble in place. The rate of retorting is controlled by regulating the volume and oxygen content of the injected air and dilutants (steam or recycled gases).

To initiate combustion, burners are placed on top of the rubble. Air is either pulled through from the top by exhaust blowers or pushed by the use of inlet blowers or air compressors. When reaction temperature (900°F) is reached, the burners are turned off. Steam or other gases are then introduced along with air to maintain burning at a desired temperature and to control the rate of flame-front advance (Fig. 2).

Product oil and water are condensed on the cooler, unretorted shale at the bottom of the retort chamber and are pumped to the surface. Off-gases are exhausted through blowers to a scrubber system above ground where the gas is contacted with a scrubbing stream to remove entrained dust and oil particles. The scrubbed gas is further treated by removing the oil and water by compression and by reduction of the sulfur compounds. Purified gas is then used for steam production or possibly gas turbine-powered electric generators.

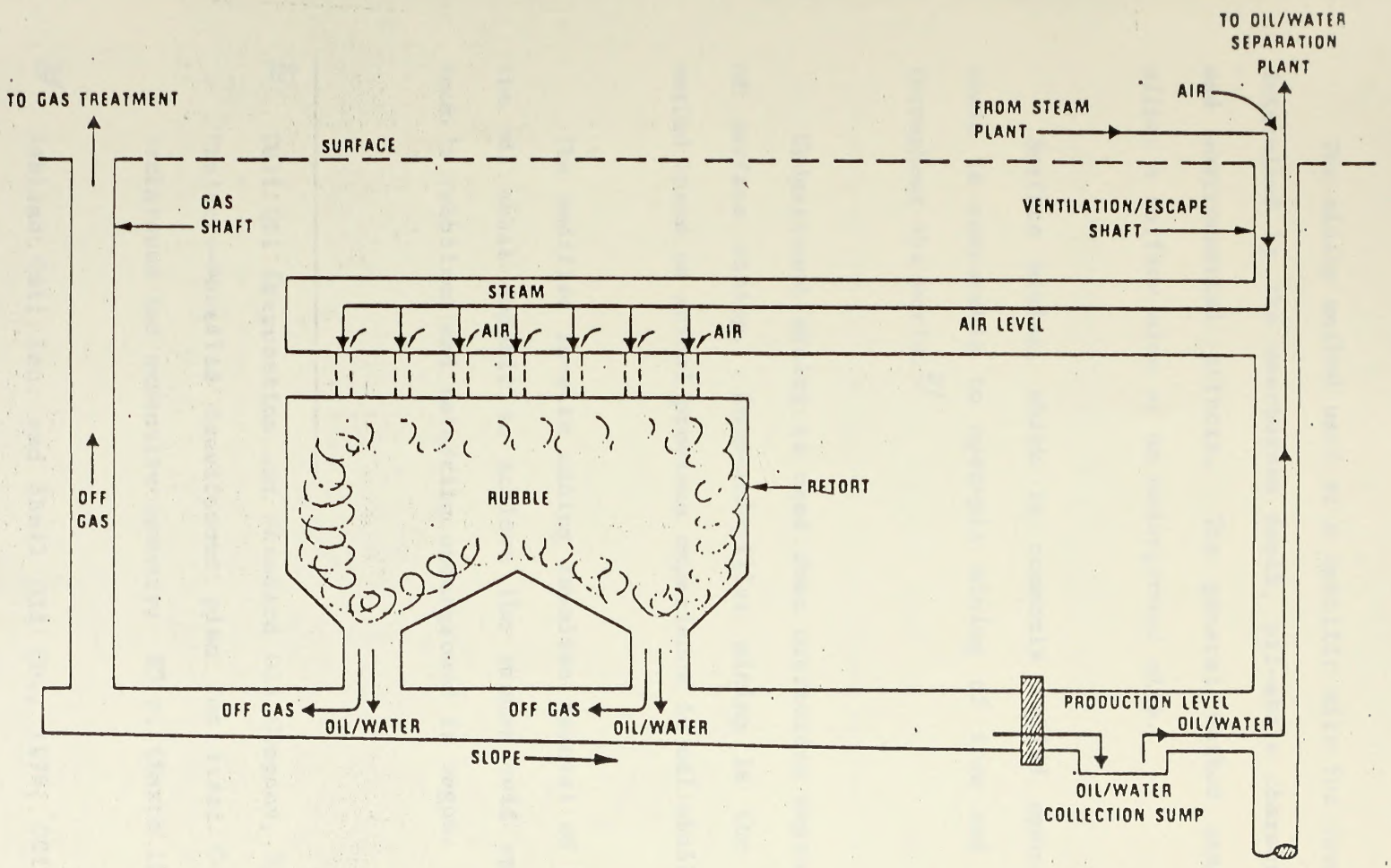


Figure 2.--Schematic diagram of a modified in-situ retort and related air and production mine levels (Ashland Colorado, Inc., and Occidental Oil Shale, Inc., 1977).

The mining method used at a specific site for developing oil shale is determined by the overburden depth, oil-shale characteristics, economics and environmental effects. The general method used is classified as either a surface mine or an underground mine.

Surface mining, which is commonly called open-pit mining, of oil shale is comparable to open-pit mining of iron and copper as practiced throughout the world.[2/]

Underground mining is used when overburden depths exceed the limits of surface mining. Room-and-pillar mining is the only proven mining method based on actual previous experience in oil shale mines.[3/]

The modified in-situ mining involves removal of 20 to 40 percent of the oil shale deposit to achieve the proper void space. The remaining rock is rubblized and retorting underground is begun.

2/ Gulf Oil Corporation and Standard Oil Company, Rio Blanco Oil Shale Project--Detailed development plan for tract C-a, Vol. 1, Project background and executive summary: 83 p. (March 1976).

3/ Ashland Oil, Inc. and Shell Oil Co., 1976, Oil Shale Tract C-b - Detailed development plan and related materials: 2v. (Chapters in each volume separately paginated.) (Feb. 1976)

There are basically two types of above ground retorts:

(1) a direct-heated retort where air is injected into a moving bed of crushed shale to support combustion and supply process heat, and

(2) an indirect-heated retort which gets heat from an external source of hot gases or hot solids.

Computation of the royalty that is to be collected from resource recovery of the prototype oil shale leases is dependent on whether the oil shale is processed by an in-situ method or whether oil shale is mined and then retorted above ground.

PURPOSE AND OBJECTIVES

The purpose and objectives of this paper are to provide guidelines and procedures for submittal, evaluation and approval of royalty due the Geological Survey of the U. S. Department of the Interior. The lessee must determine the royalty and pay the amount due on a monthly basis. Verification of the data will be done by periodic audits, inspections, and operational data calculations as per program goals and lease[4/] terms.

Figure 3 depicts a simplified flow of how the royalty will be determined for the oil shale tracts. See the lease requirements section for more detail.

4/ U. S. Bureau of Land Management, 1973. Modification of an oil shale withdrawal in Colorado, Utah, Wyoming. Federal Register 38:230, pp. 33186-33199 (November 30, 1973).

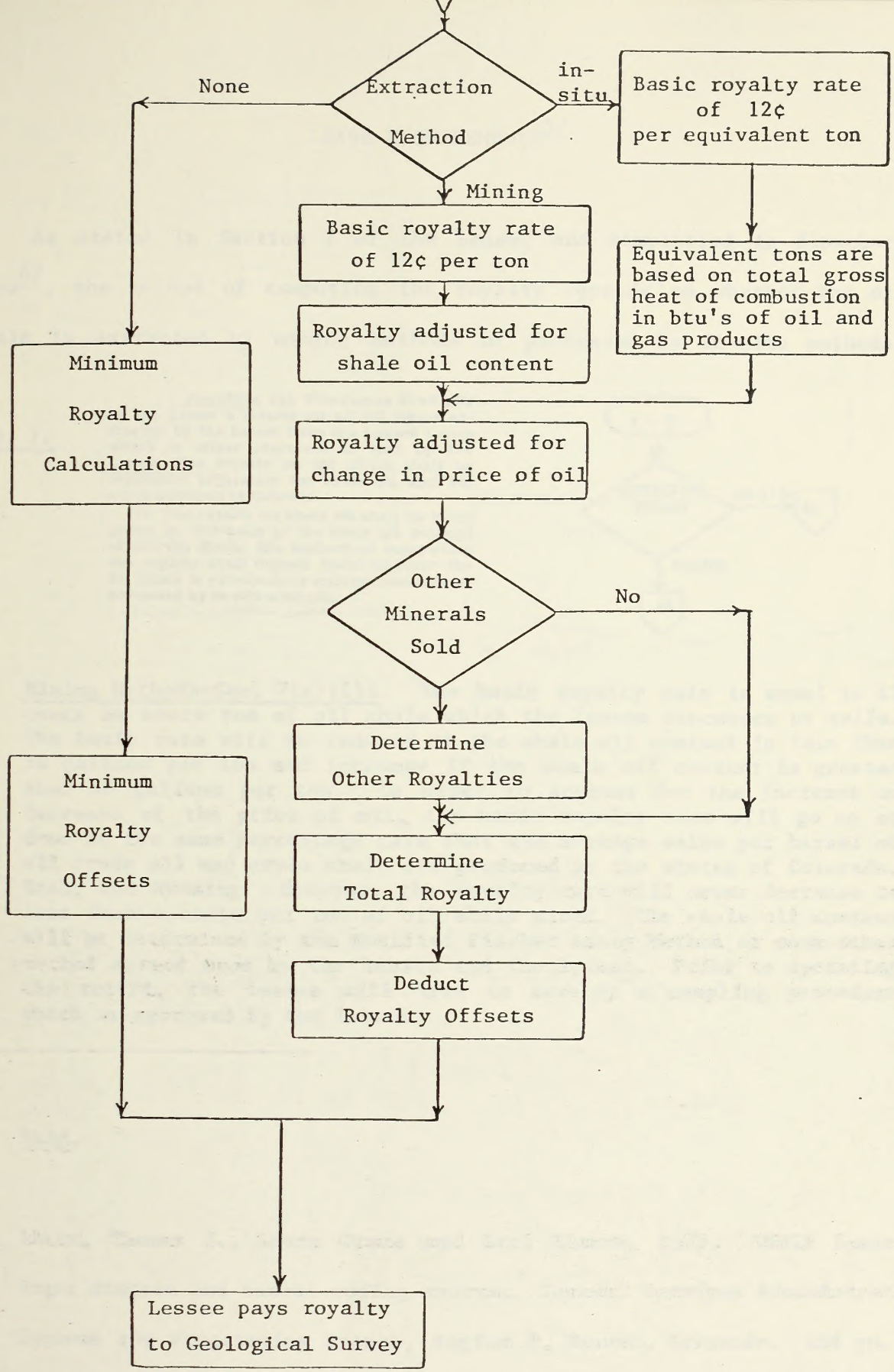

Extraction Method
None
in-situ
Mining
Basic royalty rate of 12¢ per equivalent ton
Basic royalty rate of 12¢ per ton
Equivalent tons are based on total gross heat of combustion in btu's of oil and gas products
Royalty adjusted for shale oil content
Minimum Royalty Calculations
Royalty adjusted for change in price of oil
Other Minerals Sold
No
Minimum Royalty Offsets
Determine Other Royalties
Determine Total Royalty
Deduct Royalty Offsets
Lessee pays royalty to Geological Survey

Figure 3. -- Simplified diagram of royalty determinations.

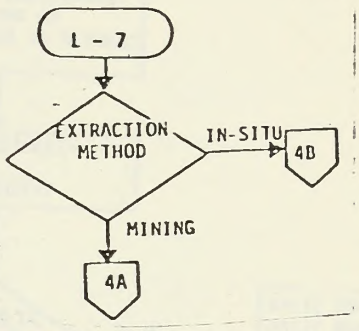
LEASE REQUIREMENTS[5/]

As stated in Section 7 of the Lease, and simplified in flowchart form[6/], the method of computing the royalty depends on whether the oil shale is extracted by mining methods or processed by in-situ methods.

Sec. 7.

Royalties. (a) The Lessee shall pay to the Lessor a royalty on all Oil Shale extracted by the Lessee from the Leased Lands which is either processed or sold by the Lessee. The royalty on Oil Shale shall be computed separately for shale oil and for other minerals as follows:

(1) The royalty on shale oil shall be computed on the basis of the shale oil content of the Oil Shale; the method of computing the royalty shall depend upon whether the Oil Shale is extracted by mining methods or processed by *in situ* methods. . . .



Mining Methods-Sec. 7(a)(1)i. The basic royalty rate is equal to 12 cents on every ton of oil shale which the lessee processes or sells. The basic rate will be reduced if the shale oil content is less than 30 gallons per ton and increase if the shale oil content is greater than 30 gallons per ton. In order to account for the increase or decrease of the price of oil, the basic royalty rate will go up or down at the same percentage rate that the average value per barrel of all crude oil and crude shale oil produced in the states of Colorado, Utah, and Wyoming. However, the royalty rate will never decrease to less than 4 cents per ton of oil shale mined. The shale oil content will be determined by the Modified Fischer Assay Method or some other method agreed upon by the lessee and the lessor. Prior to operating the retort, the lessee will have to develop a sampling procedure which is approved by the lessor.

5/ Ibid.

6/ Blair, Thomas J., Laura Grace and Earl Elmore, 1975. OSMIS lease logic diagram and manual coding system. General Services Administration, Systems and Programming Branch, Region 8, Denver, Colorado. 254 pp. (July 15, 1975)

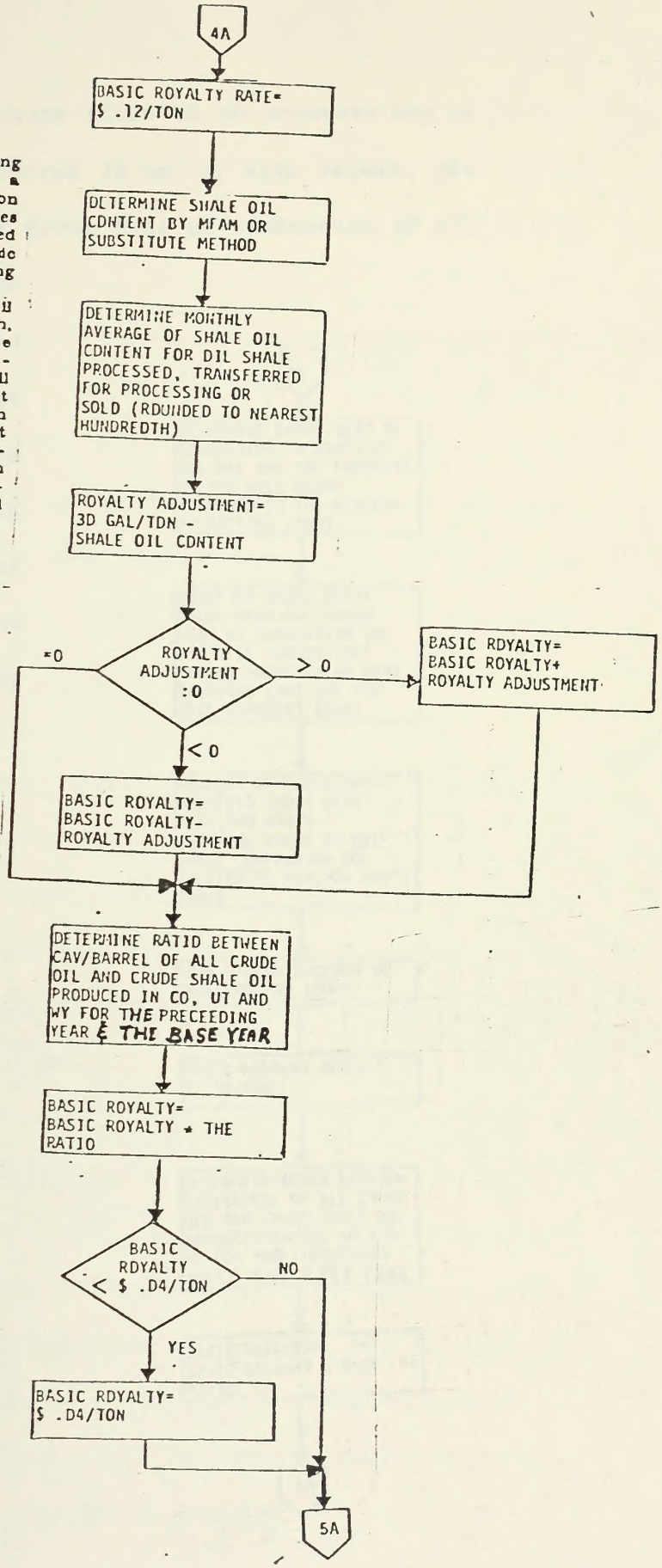
Sec. 7(a)(1)(i)

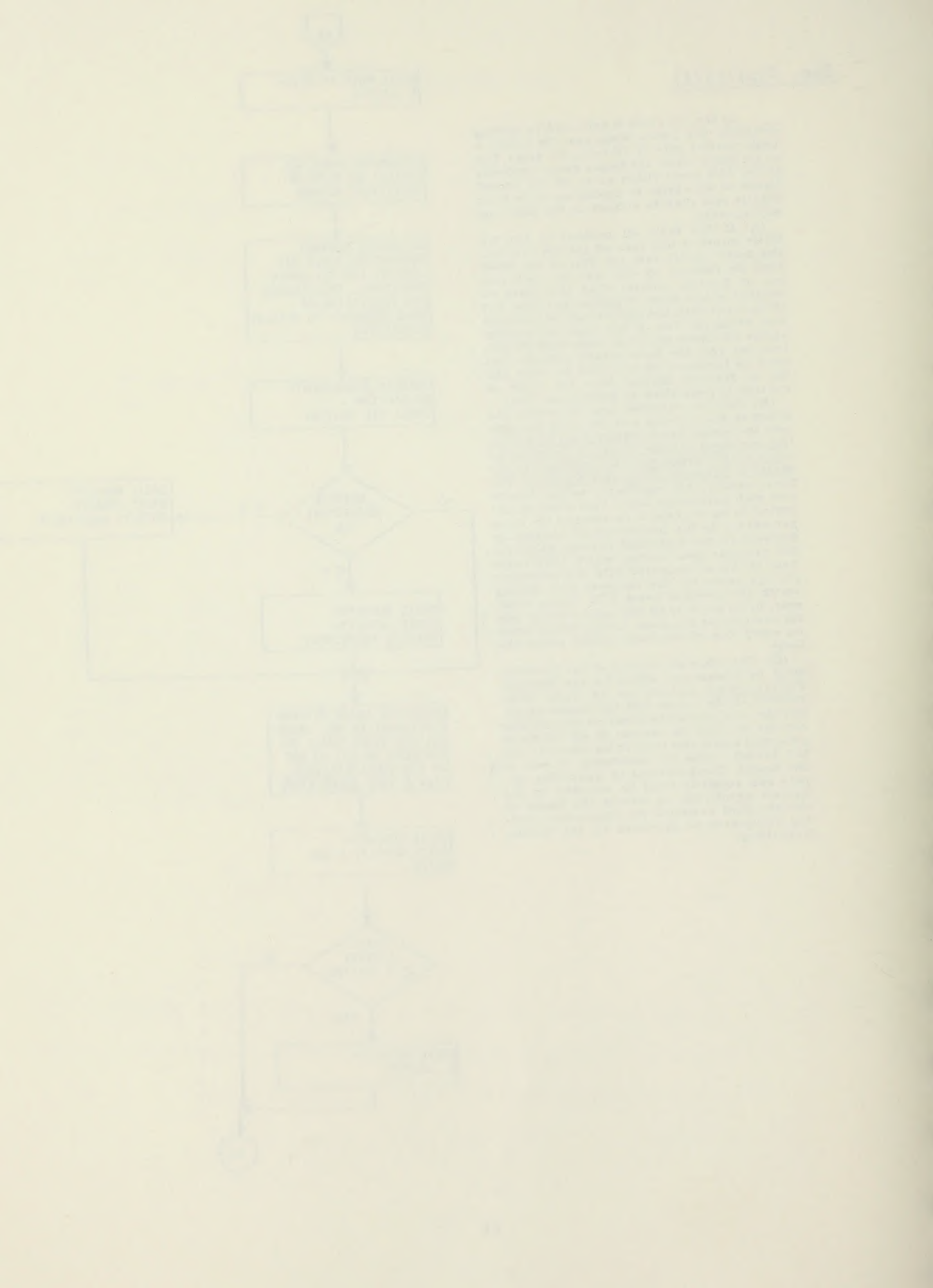
If the Oil Shale is extracted by mining methods, the Lessee shall pay the Lessor a basic royalty rate of 12 cents on every Ton of Oil Shale which the Lessee either processes under this Lease either on or off the Leased Lands or sells prior to processing. This basic royalty rate shall be subject to the following adjustments:

(A) If the shale oil content of the Oil Shale mined is less than 30 gallons per Ton, the basic royalty rate per Ton of Oil Shale shall be reduced by one cent for each gallon or fraction thereof that the shale oil content is less than 30 gallons per Ton, but in no event shall the royalty rate be less than four cents per Ton. If the shale oil content of the Oil Shale mined is more than 30 gallons per Ton, the basic royalty rate per Ton shall be increased by one cent for each gallon or fraction thereof that the shale oil content is more than 30 gallons per Ton.

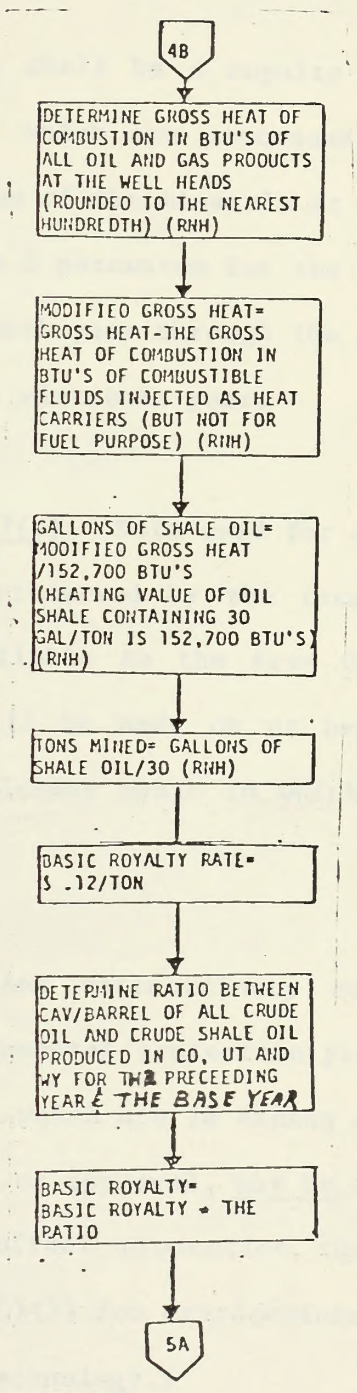
(B) For the calendar year in which the Effective Date occurs and for each calendar year thereafter, the Secretary shall determine the combined average value per barrel of all crude oil and crude shale oil produced in the States of Colorado, Utah, and Wyoming. The basic royalty rate applicable to the second and each succeeding Lease Year shall be adjusted by an increase or decrease of the same percentage as the percentage of increase or decrease in the combined average value for the calendar year during which that Lease Year begins as compared with the combined average value for the calendar year during which the previous Lease Year began. However, in no event shall the basic royalty rate for shale oil be decreased to less than 4 cents on every Ton of Oil Shale mined under the lease.

(C) The shale oil content of the Oil Shale shall be determined either by the Modified Fischer Assay method or by such other method as the Lessor and the Lessee adopt, and the royalty shall be based on the monthly average of shale oil content of all Oil Shale processed under this lease or transferred from the Leased Lands for processing or sale by the Lessee. Computations of quantities, assays and royalties shall be rounded to the nearest hundredth, or within the limits of the standard deviation for commercial testing equipment as approved by the Mining Supervisor.


4A
BASIC ROYALTY RATE= $ .12/TON
DETERMINE SHALE OIL CONTENT BY MFAM OR SUBSTITUTE METHOD
DETERMINE MONTHLY AVERAGE OF SHALE OIL CONTENT FOR OIL SHALE PROCESSED, TRANSFERRED FOR PROCESSING OR SOLD (ROUNDED TO NEAREST HUNDREDTH)
ROYALTY ADJUSTMENT= 30 GAL/TON - SHALE OIL CONTENT
ROYALTY ADJUSTMENT :0
=0
> 0
BASIC ROYALTY= BASIC ROYALTY+ ROYALTY ADJUSTMENT
< 0
BASIC ROYALTY= BASIC ROYALTY- ROYALTY ADJUSTMENT
DETERMINE RATIO BETWEEN CAV/BARREL OF ALL CRUDE OIL AND CRUDE SHALE OIL PRODUCED IN CO, UT AND WY FOR THE PRECEEDING YEAR & THE BASE YEAR
BASIC ROYALTY= BASIC ROYALTY * THE RATIO
BASIC ROYALTY < $ .04/TON
NO
YES
BASIC ROYALTY= $ .04/TON
5A



In Situ Methods-Sec. 7(a)(1)ii. Because there is no accurate way of determining the amount of tons retorted in an in situ retort, the royalty will be determined from the gross heat of combustion of all oil and gas products before they are treated or refined. Any product used as a heat carrier to the retort, but not fuel, may be deducted from the total gross heat. The gross heat in BTU's may be changed to equivalent gallons by dividing by 152,700 and then changed to equivalent tons by dividing by 30.


4B
DETERMINE GROSS HEAT OF COMBUSTION IN BTU'S OF ALL OIL AND GAS PRODUCTS AT THE WELL HEADS (ROUNDED TO THE NEAREST HUNDREDTH) (RNH)
MODIFIED GROSS HEAT= GROSS HEAT-THE GROSS HEAT OF COMBUSTION IN BTU'S OF COMBUSTIBLE FLUIDS INJECTED AS HEAT CARRIERS (BUT NOT FOR FUEL PURPOSE) (RNH)
GALLONS OF SHALE OIL= MODIFIED GROSS HEAT /152,700 BTU'S (HEATING VALUE OF OIL SHALE CONTAINING 30 GAL/TON IS 152,700 BTU'S) (RNH)
TONS MINED= GALLONS OF SHALE OIL/30 (RNH)
BASIC ROYALTY RATE= $ .12/TON
DETERMINE RATIO BETWEEN CAV/BARREL OF ALL CRUDE OIL AND CRUDE SHALE OIL PRODUCED IN CO, UT AND WY FOR THE PRECEEDING YEAR & THE BASE YEAR
BASIC ROYALTY= BASIC ROYALTY * THE RATIO
5A

Sec. 7(a)(1)(ii)

(A) If the Oil Shale is processed by in situ methods, royalty shall be paid at a basic royalty rate of 12 cents per Ton. The number of Tons processed shall, for purposes of computing royalty, be determined by: (I) establishing through calorimetric tests designated by the American Society for Testing and Materials as "Standard" or "Tentative," the total gross heat of combustion in BTUs of all oil and gas products at the well head, adjusted downward by the total gross heat of combustion in BTUs of combustible fluids (gases or liquids) injected as heat carriers, but not for fuel purposes, into the formation being processed; (II) dividing the adjusted total gross heat of combustion in BTUs by 152,700 BTUs (shale oil and gas recovered by Modified Fischer Assay of Oil Shales, containing approximately 30 gallons of shale oil per Ton, has a heating value of 152,700 BTUs per gallon of shale oil and associated gas), to arrive at the equivalent number of gallons of shale oil produced; and (III) dividing the equivalent number of gallons of shale oil produced by 30, to arrive at the number of Tons of Oil Shale processed by in situ methods.

(B) The basic royalty rate applicable to shale oil from Oil Shale process by in situ methods shall be adjusted in the same manner as that provided in paragraph (a)(1)(i)(B) of this section for the adjustment of the basic royalty rate applicable to shall oil processed from Oil Shale extracted by mining methods.

(C) Computations of quantities, assays and royalties relating to tonnage of Oil Shale shall be determined by the same standards as used under Section 7(a)(1)(i)(C).

The basic royalty rate for in situ methods is 12 cents per equivalent ton retorted. The royalty rate is then adjusted for oil price changes by multiplying by the index factor ratio as explained in the mining method.

Mineral Royalties-Sec. 7(a)(2). There shall be a royalty collected on all minerals other than shale oil which are processed or sold. The royalty shall be based on the value of the minerals at the point of shipment to the market. The rate is 3 percentum for the first ten lease years, 4 percentum for the eleventh year through the fifteenth year and 5 percentum beginning with the sixteenth year.

Data Collection and Payments-Sec. 7(b) 7(c). Data used for calculating royalty will be placed in books and preserved by the lessee. All such data and books will be made available to the Area Oil Shale Supervisor. Payments for royalties will be made on or before the last day of the month following the calendar month in which the oil shale is processed or sold.

Extraordinary Cost Offsets-Sec. 7(d). Any extraordinary costs for compliance with requirements for environmental protection prescribed in approved Detailed Development Plans, which are in excess of costs contemplated by the parties at the time of approval, may be used, at the discretion of the Secretary, to offset production royalties. (See Lease environmental stipulation 11(L)(3) for extraordinary costs related to development of revegetation technology.)

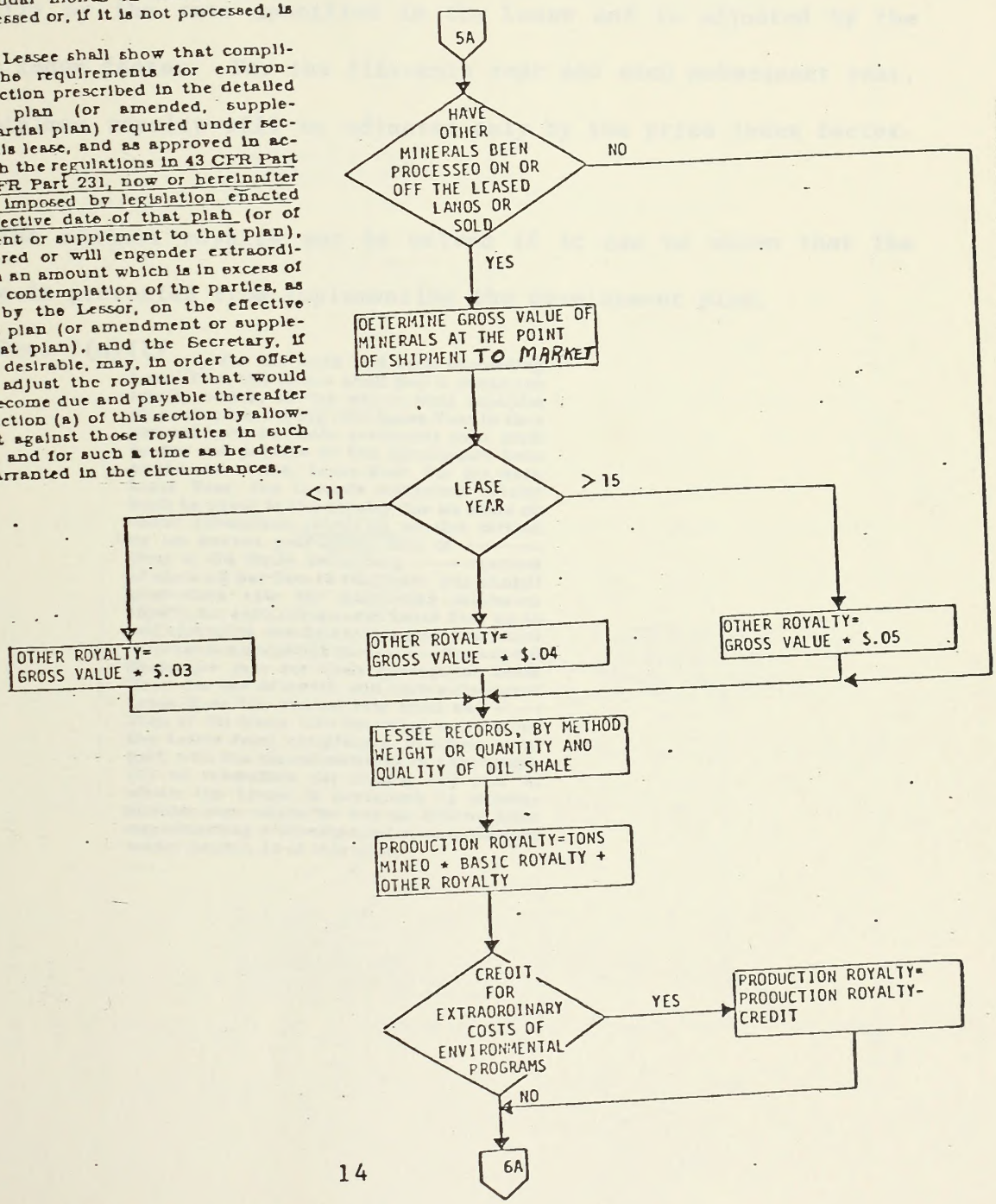
7(a)(2).

The Lessee shall pay a royalty on all minerals other than shale oil contained in Oil Shale produced from the Leased Deposits which the Lessee processes, either on or off the Leased Lands, or sells. This royalty shall be computed on the basis of the gross value of the other minerals at the point of shipment to market, and shall be at a rate of 3 per centum for the first ten Lease Years, 4 per centum for the eleventh year through the fifteenth Lease Year, and 5 per centum beginning with the sixteenth Lease Year.

(b) The Lessee shall determine accurately, on the Leased Lands, the weight or quantity and quality of all Oil Shale produced from the Leased Deposits by each method used and shall enter the weight or quantity and quality thereof accurately in books which shall be kept and preserved by the Lessee for such purposes.

(c) Payments for royalties due under this lease shall be payable monthly on or before the last day of the calendar month following the calendar month in which the Oil Shale is processed or, if it is not processed, is sold.

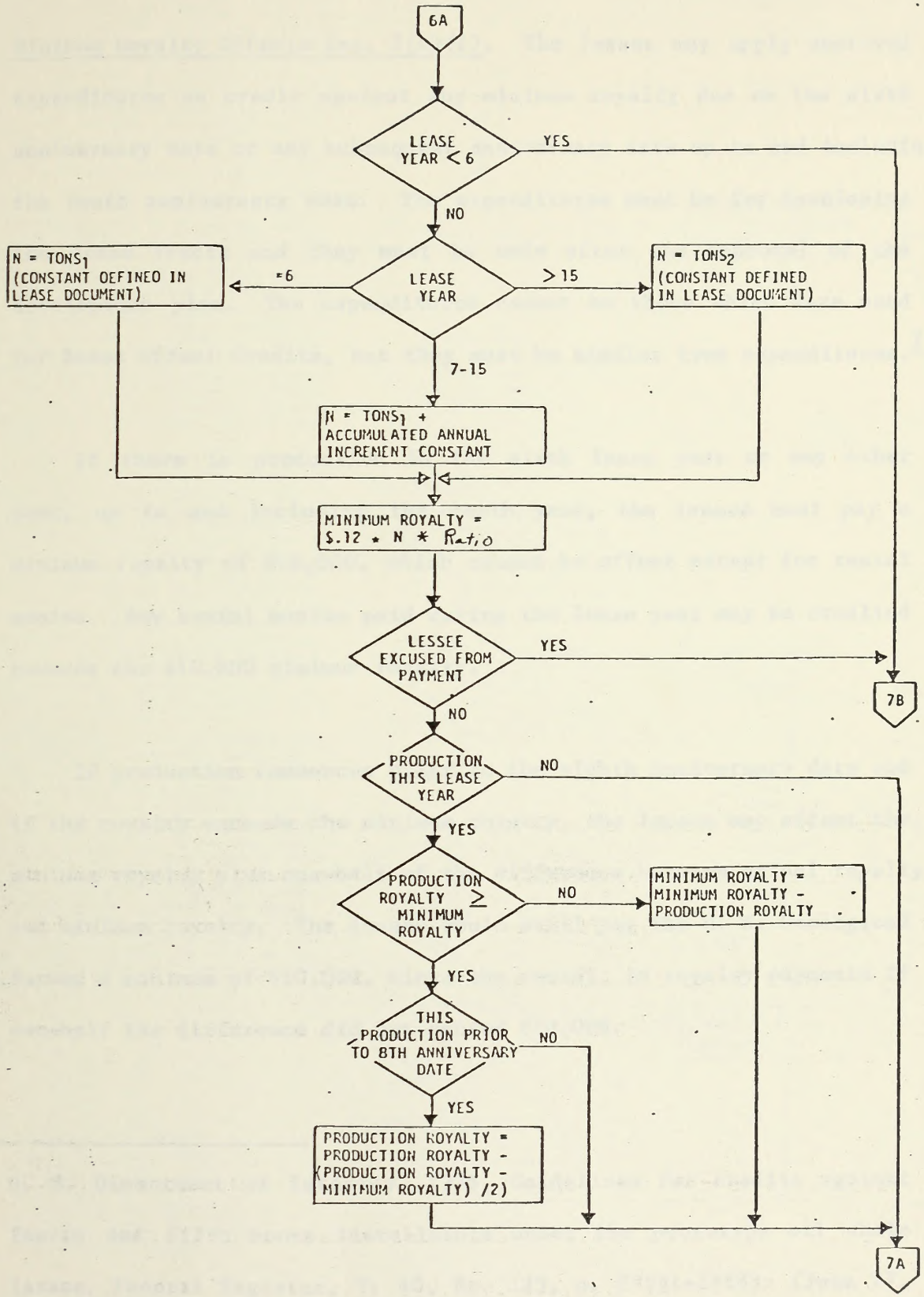
(d) If the Lessee shall show that compliance with the requirements for environmental protection prescribed in the detailed development plan (or amended, supplemental, or partial plan) required under section 10 of this lease, and as approved in accordance with the regulations in 43 CFR Part 23 and 30 CFR Part 231, now or hereinafter in force, or imposed by legislation enacted after the effective date of that plan (or of an amendment or supplement to that plan), has engendered or will engender extraordinary costs in an amount which is in excess of those in the contemplation of the parties, as determined by the Lessor, on the effective date of that plan (or amendment or supplement to that plan), and the Secretary, if he deems it desirable, may, in order to offset such costs, adjust the royalties that would otherwise become due and payable thereafter under subsection (a) of this section by allowing a credit against those royalties in such an amount, and for such a time as he determines is warranted in the circumstances.


5A
HAVE OTHER MINERALS BEEN PROCESSED ON OR OFF THE LEASED LANDS OR SOLD
NO
YES
DETERMINE GROSS VALUE OF MINERALS AT THE POINT OF SHIPMENT TO MARKET
LEASE YEAR
<11
>15
OTHER ROYALTY= GROSS VALUE * $.03
OTHER ROYALTY= GROSS VALUE * $.04
OTHER ROYALTY= GROSS VALUE * $.05
LESSEE RECORDS, BY METHOD, WEIGHT OR QUANTITY AND QUALITY OF OIL SHALE
PRODUCTION ROYALTY=TONS MINED * BASIC ROYALTY + OTHER ROYALTY
CREDIT FOR EXTRAORDINARY COSTS OF ENVIRONMENTAL PROGRAMS
YES
PRODUCTION ROYALTY= PRODUCTION ROYALTY- CREDIT
NO
6A

Minimum Royalty Sec. 7(e)(1). The lease shall pay a minimum royalty beginning at the end of the sixth lease year at the rate specified in the Lease, as adjusted by the price index factor [subsection (a)(1)(i)]. Thereafter, until the fifteenth year, the minimum royalty increases annually by the rate specified in the Lease and is adjusted by the price index factor. For the fifteenth year and each subsequent year, the minimum royalty will be adjusted only by the price index factor.

The minimum royalty may be waived if it can be shown that the lessee is prevented from implementing the development plan.

Sec. 7(e)(1) For the sixth and each succeeding Lease Year the Lessee shall pay a minimum royalty which, to the extent that royalties on production during that Lease Year in that amount have not been previously paid, shall be due and payable on the Anniversary Date at the end of that Lease Year. For the sixth Lease Year, the Lessee's minimum royalty shall be equal to the royalty due on shale oil under subsection (a)(1)(i) of this section on an annual production rate of ——— Tons of Oil Shale containing ——— gallons of shale oil per Ton of Oil Shale. The annual production rate for computing minimum royalty for each subsequent Lease Year up to and including the fifteenth Lease Year shall increase in an amount of ——— Tons of Oil Shale per year for each subsequent Lease Year; for the fifteenth and each subsequent Lease Year the annual rate shall be ——— Tons of Oil Shale. The Secretary may excuse the Lessee from compliance, in whole or in part, with the requirements of this paragraph (1) of subsection (e) during any year in which the Lessee is prevented by circumstances over which he has no control from implementing a development plan submitted under Section 10 of this lease.


6A
LEASE YEAR < 6
YES
NO
N = TONS1 (CONSTANT DEFINED IN LEASE DOCUMENT)
≤6
LEASE YEAR
>15
N = TONS2 (CONSTANT DEFINED IN LEASE DOCUMENT)
7-15
N = TONS1 + ACCUMULATED ANNUAL INCREMENT CONSTANT
MINIMUM ROYALTY = $.12 * N * Ratio
LESSEE EXCUSED FROM PAYMENT
YES
7B
NO
PRODUCTION THIS LEASE YEAR
NO
YES
PRODUCTION ROYALTY ≥ MINIMUM ROYALTY
NO
MINIMUM ROYALTY = MINIMUM ROYALTY - PRODUCTION ROYALTY
YES
THIS PRODUCTION PRIOR TO 8TH ANNIVERSARY DATE
NO
YES
PRODUCTION ROYALTY = PRODUCTION ROYALTY - (PRODUCTION ROYALTY - MINIMUM ROYALTY) /2)
7A

Minimum Royalty Offsets Sec. 7(e)(2). The lessee may apply approved expenditures as credit against any minimum royalty due on the sixth anniversary date or any subsequent anniversary date up to and including the tenth anniversary date. The expenditures must be for developing the lease tracts and they must be made after the approval of the development plan. The expenditures cannot be those which were used for Bonus Offset Credits, but they must be similar type expenditures.[7/]

If there is production in the sixth lease year or any other year, up to and including the tenth year, the lessee must pay a minimum royalty of $10,000, which cannot be offset except for rental monies. Any rental monies paid during the lease year may be credited towards the $10,000 minimum royalty.

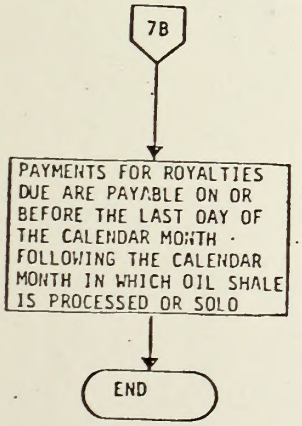
If production commences prior to the eighth anniversary date and if the royalty exceeds the minimum royalty, the lessee may offset the minimum royalty plus one-half of the difference between actual royalty and minimum royalty. The lessee would still pay the U. S. Geological Survey a minimum of $10,000, minus the rental, in royalty payments if one-half the difference did not exceed $10,000.

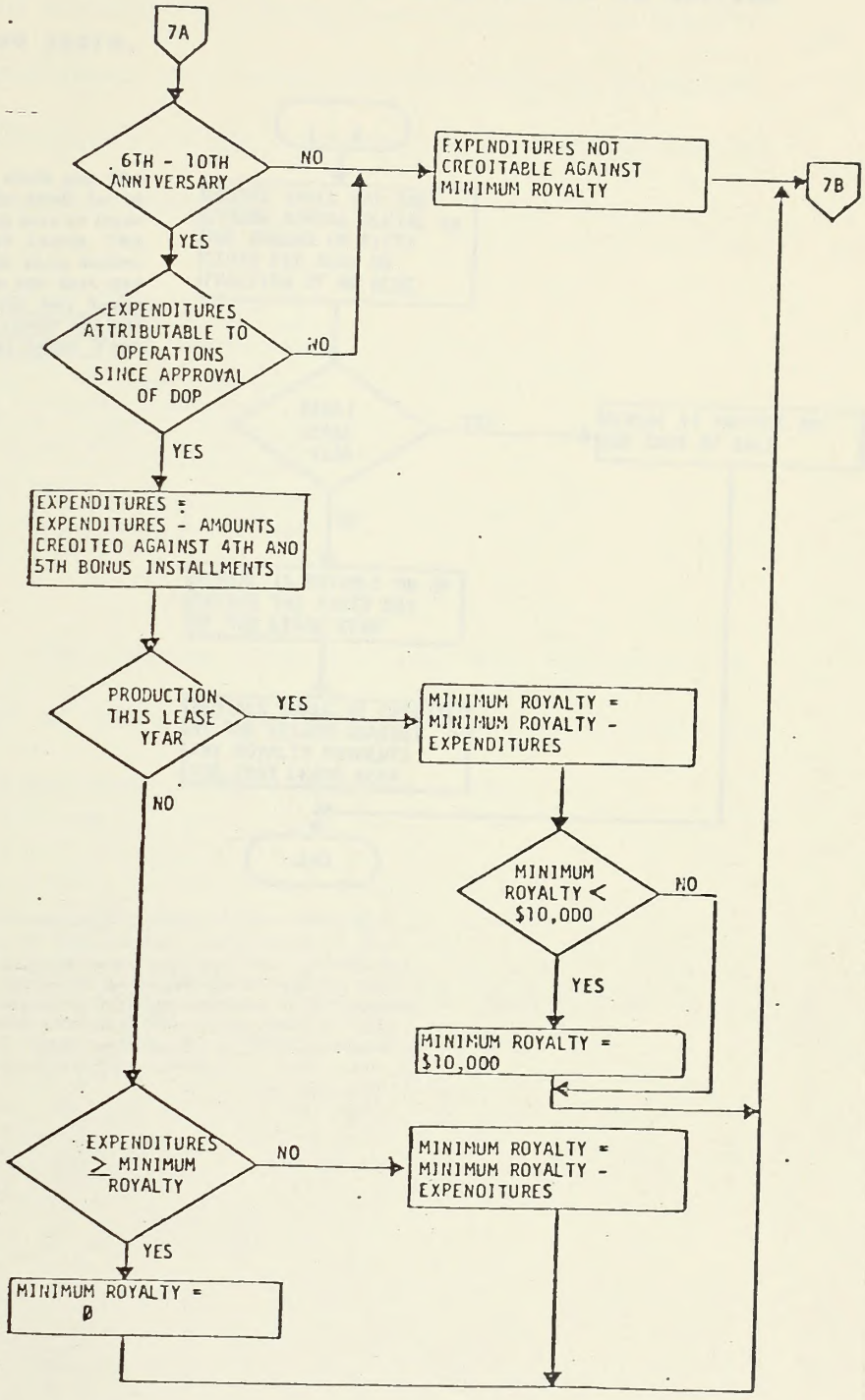
7/ U. S. Department of Interior, 1975, Guidelines for credits against fourth and fifth bonus installments under the prototype oil shale leases, Federal Register, V. 40, No. 125, p. 27281-27283. (June 27, 1975)

Sec. 7(e)(2). The Lessee may credit against any minimum royalty due on the sixth Anniversary Date or any subsequent Anniversary Date up to and including the tenth Anniversary Date the amount of any expenditures which are made between the approval of the development plan under section 10 of this lease and the tenth Anniversary Date and which are directly attributable to operations on the Leased Lands pursuant to that development plan for the development of the Leased Deposits and which were not credited against the fourth and fifth bonus installments. The Mining Supervisor shall have the duty of determining whether expenditures credited by the Lessee are attributable to such operations, and, if the Mining Supervisor determines that any reported expenditure is not attributable to such operations, the Lessee shall not receive credit for the expenditure. Upon the credit of an expenditure against the minimum royalty due, the Lessee will be relieved of the duty of paying the equivalent amount of minimum royalty: *Provided, however,* That, if there is actual production in the sixth or any subsequent Lease Year, the Lessee shall not be permitted to credit expenditures against the first $10,000 of minimum royalty due for that Lease Year.

(f) If the Lessee enters into production prior to the eighth Anniversary Date, and the royalty due in the eighth or any previous Lease Year exceeds the minimum royalty due under subsection (e)(1) of this section for that Lease Year, the Lessee shall be relieved from the payment of one-half of the difference between the actual royalty due for that Lease Year and the figure set in subsection (e)(1) for minimum royalty due for that Lease Year. This relief from the payment of royalty shall be in addition to any crediting of expenditures under subsection (e)(2) of this section, but no crediting of expenditures against minimum royalty shall reduce the figure for minimum royalty used in the preceding sentence.

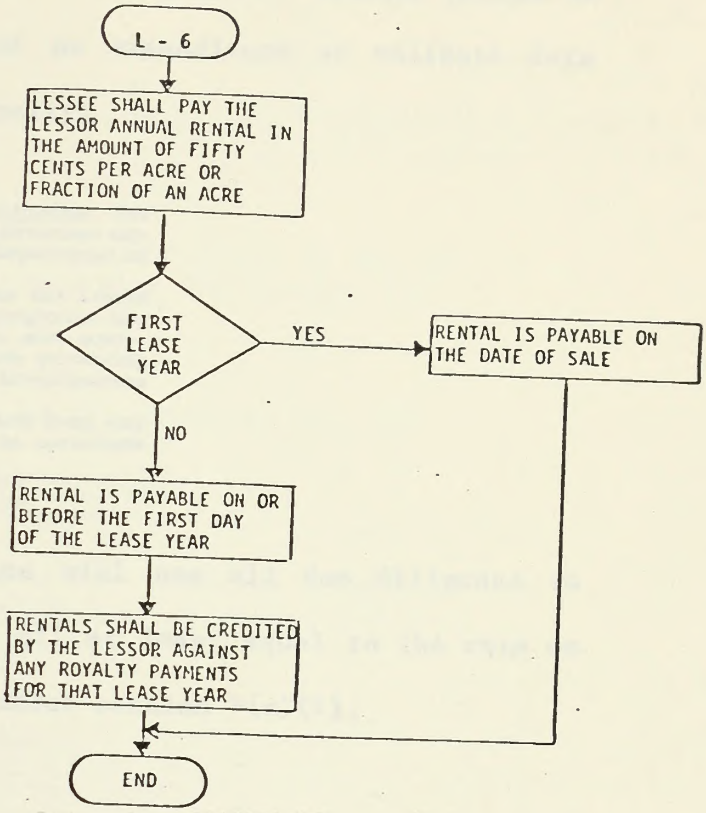
Sec. 8. *Payments.* All bonus installments shall be paid to the appropriate State Office of the Bureau. All rental payments shall be made to the appropriate State Office of the Bureau until this lease enters a producing status or minimum royalty is required to be paid on it; thereafter the rentals and royalties shall be paid to the appropriate Mining Supervisor with whom all reports (including any reports on expenditures deductible under section 5) concerning operations under the lease shall be filed. All remittances to the Bureau shall be made payable to the Bureau of Land Management; those to the Geological Survey shall be made payable to the United States Geological Survey.


7B
PAYMENTS FOR ROYALTIES DUE ARE PAYABLE ON OR BEFORE THE LAST DAY OF THE CALENDAR MONTH FOLLOWING THE CALENDAR MONTH IN WHICH OIL SHALE IS PROCESSED OR SOLD
END



As stated in Section 6 of the lease, the rental shall be credited against any royalty payments. The rental credits cannot be carried forward to future lease years.

Sec. 6. . *Rentals.* The Lessee shall pay the Lessor an annual rental which shall be in the amount of 50 cents for each acre or fraction of an acre of the Leased Lands. The Lessee shall pay the rental for each subsequent Lease Year on or before the first day of that Lease Year. Rentals for any Lease Year shall be credited by the Lessor against any royalty payments for that Lease Year.


L - 6
LESSEE SHALL PAY THE LESSOR ANNUAL RENTAL IN THE AMOUNT OF FIFTY CENTS PER ACRE OR FRACTION OF AN ACRE
FIRST LEASE YEAR
YES
RENTAL IS PAYABLE ON THE DATE OF SALE
NO
RENTAL IS PAYABLE ON OR BEFORE THE FIRST DAY OF THE LEASE YEAR
RENTALS SHALL BE CREDITED BY THE LESSOR AGAINST ANY ROYALTY PAYMENTS FOR THAT LEASE YEAR
END

Audits and Inspections. Section 15 of the lease and Title 30 CFR, Parts 231.62 and 231.70 provide the Mining Supervisor with authority to conduct audits, inspections, and investigations whenever needed to substantiate the creditability of an expenditure or validate data that was used to calculate the royalty.

Sec. 15. *Inspection and investigation.* The Lessee shall permit any duly authorized officer or representative of the Department at any reasonable time:

(a) to inspect or investigate the Leased Lands and all surface and underground improvements, works, machinery, and equipment, and all books and records pertaining to operations and surveys or investigations under this lease; and

(b) to copy and make extracts from any books and records pertaining to operations under this lease.

Diligence Requirements. The lessee will use all due diligence to attain a production rate of shale oil at least equal to the rate on which minimum royalty is computed under section 7(e)(1).

Sect. 10.(a)(3) a requirement that the Lessee use all due diligence in the orderly development of the Leased Deposits, and, in particular, to attain, at as early a time as is consistent with compliance with all the provisions of this lease, production at a rate at least equal to the rate on which minimum royalty is computed under section 7(e)(1).

ROYALTY CALCULATIONS

The method of computing the royalty depends on whether the oil shale is extracted by mining methods or processed by in-situ methods. Items 1 and 2 illustrate the calculations of computing the royalty.

1. Royalty from in situ operations. Section 7(a)(1)(i)(A) of the oil shale lease describes the method for calculating the tonnage for which royalty must be paid:

   Step 1

   $$\text{Tons} = \text{Gross heat of combustion of all products (btu's)} \times \frac{1 \text{ gallon oil}}{152{,}700 \text{ btu's}} \times \frac{1 \text{ ton oil shale}}{30 \text{ gals}}$$

   Gross heat of combustion = total gross heat of combusion from oil produced during reporting period plus gross heat of combustion from gas produced during reporting period.

   Step 2

   $$\text{Royalty} = \text{Tons} \; \frac{\$.12}{\text{Ton}} \times \text{Index factor}$$

2. Royalty from mining when processed in surface retort or sold:

   a. $$\text{Royalty} = \text{tons mined} \left| \frac{\$0.12 - (\$0.01(30-\text{assay}))}{\text{ton}} \right| \text{index factor}$$

   b. If $[\$0.12 - (\$0.01(30-\text{assay}))] < \$0.04$

   then: $$\text{Royalty} = \text{tons mined} \left| \frac{\$0.04}{\text{ton}} \right| \text{index factor}$$

   For purposes of royalty reporting, Form 9-268 must be used.

Table 1 illustrates an example of the data needed for royalty calculation of a 50,000 barrel-per-day in situ operation or a 50,000 barrel-per-day mining operation. Standard forms will be sent to the lessees by the

Geological Survey. These forms will be filled out by the lessee and sent to the appropriate Geological Survey office once a month with the royalty payments.

Basis = 50,000 barrels/day of shale oil by modified in situ methods

and

50,000 barrels/day of shale oil by underground mining and aboveground retorting.

9-808
(March 1958)

Budget Bureau No. 42-R67.3.
Approval expires 12-31-61.

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MINING BRANCH

Serial No. .....
Land Office .....

Production and Royalty Report for { MONTH / QUARTER } ending .....

Report to be submitted to the Regional Mining Supervisor, U. S. Geological Survey. Copies of drill hole records to be submitted in duplicate. Maps to be submitted in duplicate at least annually.

Mine Output: (*a*) Crude ore or rock mined ..... tons

(*b*) Average analysis ..... percent

PRODUCTION AND SALES

PRODUCT	GRADE	TONS PRODUCED	TONS IN STORAGE	TONS DISPOSED OF	PER TON VALUE AT POINT OF SHIPMENT	TOTAL VALUE OF PRODUCT DISPOSED OF	ROYALTY AT % OR $ A TON
TOTAL							

Remarks: .....

.....

Name ..... Title ..... Date .....

18 U. S. C., section 1001, makes it a criminal offense to make a willfully false statement or representation to any Department or Agency of the United States as to any matter within its jurisdiction.

U. S. GOVERNMENT PRINTING OFFICE 16—51022-5

TABLE 1. -- Data needed for oil shale royalty calculations

(for demonstration use only)

(example only)

Reporting period	August 1, 1978 thru August 30, 1978
Oil shale produced, tons (surface retort only)	2,268,784
Fischer assay of oil shale, gals/ton	27
Price adjustment index factor	1.226
Gas product, mmscf (MIS only)	40,342
Gas heat of combustion, btu's/scf (MIS only)	78.14
Shale oil produced (MIS only)	1,458,500
Oil heat of combustion, btu's/gal (MIS only)	135,298

In Situ Retorting

$$\text{Tons} = \text{Total Gross heat of combustion} \Big| \frac{1 \text{ gallon oil}}{152{,}700 \text{ btu's}} \times \frac{1 \text{ ton oil shale}}{30 \text{ gallons}}$$

$$\text{Gross heat of combustion from oil} = 1{,}458{,}500 \text{ bbls} \Big| \frac{42 \text{ gal}}{1 \text{ bbl}} \Big| \frac{135{,}298 \text{ btu's}}{1 \text{ gal}}$$

$$= 8.28\ (10)^{12} \text{ btu's}$$

$$\text{Gross heat of combustion from gas} = 40{,}342 \text{ mmscf} \Big| \frac{78.14 \text{ btu's}}{\text{scf}}$$

$$= 3.15\ (10)^{12} \text{ btu's}$$

$$\text{Total gross heat of combustion} = 11.43\ (10)^{12} \text{ btu's}$$

$$\text{Tons} = 11.43\ (10)^{12} \text{ btu's} \Big| \frac{1 \text{ gallon}}{152{,}700 \text{ btu's}} \times \frac{1 \text{ ton oil shale}}{30 \text{ gallons}}$$

$$= 2{,}495{,}288.42 \text{ tons}$$

$$\text{Royalty} = 2{,}497{,}271.34 \text{ tons} \times \frac{\$.12}{1 \text{ ton}} \times 1.226$$

$$= \$367{,}398.56$$

SAMPLE

P-B08
(March 1958)

Budget Bureau No. 42-R357.8.
Approval expires 12-31-61.

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MINING BRANCH

Serial No. C-4321
Land Office Denver, CO.

Production and Royalty Report for [MONTH / ~~QUARTER~~] ending August 30, 1978

Company Name and Address

Report to be submitted to the Regional Mining Supervisor, U. S. Geological Survey. Copies of drill hole records to be submitted in duplicate. Maps to be submitted in duplicate at least annually.

Mine Output: (a) Crude ore or rock mined NA tons

(b) Average analysis NA percent

PRODUCTION AND SALES

PRODUCT	GRADE	TONS PRODUCED	TONS IN STORAGE	TONS DISPOSED OF	PER TON VALUE AT POINT OF SHIPMENT	TOTAL VALUE OF PRODUCT DISPOSED OF	ROYALTY AT OR 12 ½ % * A TON
Oil Shale	27 gpt	2,495,288	NA	NA	NA	NA	$367,399.00
TOTAL		2,495,288					$367,399.00

Remarks: MIS retorting Operation, see attached Table 1

* Index factor = 1.226

Name _____ Title _____ Date _____

18 U. S. C., section 1001, makes it a criminal offense to make a willfully false statement or representation to any Department or Agency of the United States as to any matter within its jurisdiction.

U. S. GOVERNMENT PRINTING OFFICE 16—81922-5

Aboveground Retorting

$$\text{Royalty} = \text{Tons retorted} \mid \frac{\$0.12-(\$0.01)(30-\text{Assay})}{\text{ton}} \mid \text{Index factor}$$

$$= 2{,}268{,}784 \text{ tons} \mid \frac{0.12 - \$0.01(30-27)}{\text{ton}} \mid 1.226$$

$$= 204{,}190.56 \times 1.226$$

$$= \$250{,}337$$

9-808
(March 1948)

SAMPLE

Budget Bureau No. 42-R367.8.
Approval expires 12-31-61.

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MINING BRANCH

Serial No. C-1234
Land Office Denver, CO

Production and Royalty Report for { MONTH / ~~QUARTER~~ } ending August 30, 1978

Company Name and Address

Report to be submitted to the Regional Mining Supervisor, U. S. Geological Survey. Copies of drill hole records to be submitted in duplicate. Maps to be submitted in duplicate at least annually.

Mine Output: (a) Crude ore or rock mined 2,268,784 tons

(b) Average analysis 27 gpt ~~percent~~

PRODUCTION AND SALES

PRODUCT	GRADE	TONS PRODUCED	TONS IN STORAGE	TONS DISPOSED OF	PER TON VALUE AT POINT OF SHIPMENT	TOTAL VALUE OF PRODUCT DISPOSED OF	ROYALTY AT 12 ½ % OR * A TON
Oil Shale	27 gpt	2,268,784	NA	NA	NA	NA	$250,337.00
TOTAL		2,268,784					$250,337.00

Remarks: Surface retorting operation, see attached Table 1.

* Index factor = 1.226

Name _____ Title _____ Date _____

18 U. S. C., Section 1001, makes it a criminal offense to make a willfully false statement or representation to any Department or Agency of the United States as to any matter within its jurisdiction.

U. S. GOVERNMENT PRINTING OFFICE 16—81022-3

Mineral Royalty

There shall be a royalty calculated on all minerals other than shale oil which are processed or sold. The royalty shall be based on the value of the minerals at the point of shipment. In case alumina and soda ash are made from dawsonite and sold, examples of how the royalties are to be calculated are given. For easy calculation, 3,000 tons/month of alumina and soda ash are used.

Alumina

First 10 lease years	=	3,000 tons	$160[8/] / ton	0.03
	=	$14,400		
11th through 15th lease years	=	$480,000 (0.04)		
	=	$19,200		
16th year until end of lease	=	$480,000 (0.05)		
	=	$24,000		

assuming the price remained at $160/ton

8/ Farris, Clifford B. and Mains, Charles J., 1978, Dawsonite and Nahcolite Survey: DOE contract No. EC-77-s-07-1183, IDO-1683-1 (v. 1 of 2), p. A-56. (April 1978)

Soda Ash

First 10 lease years	=	3,000 tons	$55[9/] / ton	0.03
	=	$165,000 x .03		
	=	$4,950		
11th through 15th	=	$165,000 (0.04)		
	=	$6,600		
16th year until end of lease	=	$165,000 (0.05)		
	=	$8,250		

assuming the price stayed at $55/ton.

9/ Ibid.

MINIMUM ROYALTY

In order to encourage the lessees to reach production as fast as possible, Section 7(e)(1) of the Prototype Oil Shale Lease requires the lessee to pay a minimum royalty rate of production. Table 4 gives the minimum production rates for Tracts C-a and C-b which are specified in the individual leases. Therefore as the lease states that the minimum royalty will be based on 30 gallons per ton oil shale, no adjustment for grade is required or necessary. The royalty rate index factor is based on the average price of oil at the wellhead reported for the states of Colorado, Wyoming, and Utah [Sec. 7(a)(1)]. If the data that are used for calculating the index factor are not received in time, the last known index factor will be used, and at such time the index factor does become known, there will be a correction made for the minimum royalty. The same is true for the actual royalty if there is production.

Table 5 gives the index factor for 1970 through 1977. The index factor for 1974 is 1.000, as 1974 is the year that the leases were leased. The data for calculating the index factors will be sent to the lessees by the Geological Survey as soon as the data reports are published. Since minimum royalties are due at the end of the lease year, the index factor should be known before the minimum royalty is due.

TABLE 2. -- Minimum production and royalty rates for oil shale tracts C-a and C-b

Lease Year and Due Date	Production Rate tons/year	Royalty $/year
		10/
Tract Ca - 6th (March 1, 1981)	1,130,000	$135,600X(1980 I.F.)
Tract Cb - 6th (April 1, 1981)	616,000	73,920X(1980 I.F.)
Tract Ca - 7th (March 1, 1982)	2,260,000	$271,200X(1981 I.F.)
Tract Cb - 7th (April 1, 1982)	1,232,000	147,840X(1981 I.F.)
Tract Ca - 8th (March 1, 1983)	3,390,000	$406,800X(1982 I.F.)
Tract Cb - 8th (April 1, 1983)	1,848,000	221,760X(1982 I.F.)
Tract Ca - 9th (March 1, 1984)	4,520,000	$542,400X(1983 I.F.)
Tract Cb - 9th (April 1, 1984)	2,464,000	295,680X(1983 I.F.)
Tract Ca - 10th (March 1, 1985)	5,650,000	$678,000X(1984 I.F.)
Tract Cb - 10th (April 1, 1985)	3,080,000	369,600X(1984 I.F.)
Tract Ca - 11th (March 1, 1986)	6,780,000	$813,600X(1985 I.F.)
Tract Cb - 11th (April 1, 1986)	3,696,000	443,520X(1985 I.F.)
Tract Ca - 12th (March 1, 1987)	7,910,000	$949,200X(1986 I.F.)
Tract Cb - 12th (April 1, 1987)	4,312,000	517,440X(1986 I.F.)
Tract Ca - 13th (March 1, 1988)	9,040,000	$1,084,800X(1987 I.F.)
Tract Cb - 13th (April 1, 1988)	4,928,000	591,360X(1987 I.F.)
Tract Ca - 14th (March 1, 1989)	10,170,000	$1,220,400X(1988 I.F.)
Tract Cb - 14th (April 1, 1989)	5,544,000	665,280X(1988 I.F.)
Tract Ca - 15th (March 1, 1990)	11,300,000	$1,356,000X(1989 I.F.)
Tract Cb - 15th (April 1, 1990)	6,160,000	739,200X(1989 I.F.)
Tract Ca - 16th to end of lease	11,300,000	$1,356,000X(I.F.)
Tract Cb - 16th to end of lease	6,160,000	739,200X(I.F.)

10/ Crude Petroleum, Petroleum Products, and Natural Gas Liquids: (Final Summary), Energy Data Reports, DOE, EIA, Washington, D.C. 20467.

(See following table for calculation of index factor as required by Sec. 7(a)(1)(i)B of the Lease.)

TABLE 3. -- Index factor ratio used to calculate the royalty rates for tracts C-a and C-b[11/]

Year	COLORADO			UTAH			WYOMING			3 STATE TOTAL			Index Factor
	Quantity k-bbls	Wellhead Value k-$	Value $/bbl	Quantity k-bbls	Wellhead Value k-$	Value $/bbl	Quantity k-bbls	Wellhead Value k-$	Value $/bbl	Quantity k-bbls	Wellhead Value k-$	Value $/bbl	
1970	24,723	78,619	3.18	23,370	65,603	2.81	160,345	469,811	2.93	208,438	614,033	2.95	0.432
1971	27,391	92,855	3.39	23,630	71,866	3.04	148,114	459,079	3.10	199,135	623,800	3.13	0.459
1972	32,015	109,171	3.41	26,570	80,773	3.04	140,011	432,071	3.09	198,596	622,015	3.13	0.459
1973	36,590	155,507	4.25	32,656	117,743	3.61	141,914	541,820	3.82	211,160	815,070	3.86	0.566
1974 [1/]	37,508	283,904	7.57	39,363	279,858	7.11	139,997	914,360	6.53	216,868	1,478,122	6.82	1.000
1975	38,089	365,654	9.60	42,301	348,131	8.23	135,943	983,705	7.24	216,333	1,697,570	7.85	1.151
1976	38,992	376,273	9.65	34,304	318,911	9.30	134,149	971,235	7.24	207,445	1,666,419	8.03	1.177
1977	39,460	398,457	10.10	33,113	308,872	9.33	136,472	1,039,948	7.62	209,045	1,747,277	8.36	1.226
1978	36,797	365,024	9.92	31,368	313,009	9.98	137,385	1,258,293	9.16	205,550	1,936,326	9.42	1.381
1979	32,324	424,737	13.14	27,728	316,376	11.41	131,890	1,121,063	8.50	191,942	1,862,176	9.70	1.423
1980	29,802	616,603	20.69	24,978	494,564	19.80	126,362	2,700.356	21.37	181,142	3,811,523	21.04	3.085

[1/] Calendar year lease was signed is considered the base year.

[11/] Ibid

TABLE 3. -- Index factor ratio used to calculate the royalty rates for tracts C-a and C-b11/

Year	COLORADO			UTAH			WYOMING			3 STATE TOTAL			Index Factor
	Quantity k-bbls	Wellhead Value k-$	Value $/bbl	Quantity k-bbls	Wellhead Value k-$	Value $/bbl	Quantity k-bbls	Wellhead Value k-$	Value $/bbl	Quantity k-bbls	Wellhead Value k-$	Value $/bbl	
1980	29,802	616,603	20.69	24,978	494,564	19.80	126,362	2,700,356	21.37	181,142	3,811,523	21.04	3.085
1981	30,303	1,081,514	35.69	23,712	809,528	34.14	122,174	3,944,998	32.29	176,189	5,836,040	33.12	4.86
1982	30,545	964,306	31.57	23,453	714,847	30.48	118,300	3,467,373	29.31	172,298	5,146,526	29.87	4.38
1983	29,050	839,835	28.91	29,534	830,496	28.12	118,303	3,215,475	27.18	176,887	4,885,806	27.62	4.05
1984	28,845	810,256	28.09	34,689	943,888	27.21	124,269	3,321,710	26.73	187,803	5,075,854	27.03	3.96
1985	29,567	758,098	25.64	32,033	772,956	24.13	124,098	3,061,498	24.67	185,698	4,592,552	24.73	3.63

30a

* 1983 numbers came from William Jeffers, Bureau of Labor Statistics 252-8800
1984 Freitis
1985 Charles Shirkey Energy Inf. Admin. -DOE 252-6567

ROYALTY OFFSET CREDITS

As an incentive for diligent development of the leased lands, the lease allowed credits for any expenditures prior to the third and fourth anniversary dates which were directly attributable to operations for the development of the leased deposits against the fourth and fifth bonus installments of the five bonus installments bid for the lease tracts. Likewise, the lease allows the minimum royalty due the government for the sixth through the tenth lease years to be offset with expenditures which are directly attributable to operations for the development of the lease deposits.

When production does commence, a minimum royalty of $10,000 per year must be paid the Geological Survey. The following depicts the equations used for calculating the royalty due:

1. Rentals paid at the beginning of each lease may be used as a credit towards any royalty due that year, but cannot be carried forward as a credit for future lease years.

2. Lease years 6, 7 and 8.

$$\text{Royalty due} = \text{Minimum royalty} - \text{approved expenses} + \tfrac{1}{2}(\text{Royalty}^{12/} - \text{Minimum Royalty}) \geq (\$10{,}000 - \text{Rental})^{13/}$$

3. Lease years 9 and 10.

$$\text{Royalty due} = \text{Minimum royalty} - \text{approved expenses.} + (\text{Royalty}^{12/} - \text{Minimum Royalty} \geq (\$10{,}000 - \text{Rental})^{13/}$$

12/ Royalty must exceed minimum royalty for this part of the equation to be used.

13/ Any rent monies may be credited towards the minimum $10,000 royalty. If production did not occur during the year, rental monies may be applied towards the minimum royalty due.

4. Lease year 11 until end of the lease -

Royalty due = Minimum Royalty + (Royalty - Minimum Royalty)[12/] - Rental

Tract C-a

6th - 8th year = Minimum Royalty - approved expenses + ½(Royalty - Minimum Royalty) $\geq$ ($10,000 - Rental)

6th year = $135,600 (1979 Index factor) - approved expenses + ½(Royalty - $135,600(1979 Index factor)) $\geq$ ($10,000-Rental)

7th year = $271,200(1980 Index factor) - approved expenses + ½(Royalty - $271,200(Index factor)) $\geq$ ($10,000-Rental)

8th year = $406,800(1981 Index factor) - approved expenses + ½(Royalty - $406,800(Index factor)) $\geq$ ($10,000-Rental)

9th year = $542,400(1982 Index factor) - approved expenses + (Royalty - Minimum Royalty) $\geq$ ($10,000-Rental)

10th year = $678,000(1983 Index factor) - approved expenses + (Royalty - Minimum Royalty) $\geq$ ($10,000-Rental)

11th - 20th year = Minimum Royalty + (Royalty - Minimum Royalty[12/] - Rental

Tract C-b

6th - 8th year = Minimum Royalty - approved expenses + ½(Royalty - Minimum Royalty) $\geq$ ($10,000-Rental)

6th year = $73,920(1979 Index factor) - approved expenses + ½(Royalty - $73,920(1979 Index factor)) $\geq$ ($10,000-Rental)

7th year = ($147,840)(1980 Index factor) - approved expenses + ½(Royalty - $147,840(1980 Index factor)) $\geq$ ($10,000-Rental)

8th year = $221,760(1981 Index factor) - approved expenses + ½(Royalty - $221,760(1981 Index factor)) $\geq$ ($10,000-Rental)

9th year = $295,680(1982 Index factor) - approved expenses

+ (Royalty - Minimum Royalty) $\geq$ ($10,000-Rental)

10th year = $369,600(1983 Index factor) - approved expenses

(Royalty - Minimum Royalty $\geq$ ($10,000-Rental)

11th - 20th year = Minimum Royalty + (Royalty - Minimum royalty) - Rental

Section 6 of the lease allows credits of any rent monies towards royalty payments for that lease year.

1. C-a - Rental = $\frac{(5,089.70 \text{ acres})(\$0.50)}{(\text{acre})(\text{year})}$

= $\underline{\$2,545/\text{year}}$

2. C-b - Rental = $\frac{(5,093.90 \text{ acres})(\$0.50)}{(\text{acre})(\text{year})}$

= $\underline{\$2,547/\text{year}}$

The royalty offset expenditures will be handled in the same manner as bonus offset expenditures for the fourth and fifth bonus installments. All requests must be accompanied by evidence supporting that an actual expenditure has been incurred by the lessee. Evidence of payment shall be submitted with a brief, but accurate description of the expenditure and its use.

SUMMARY AND CONCLUSIONS

The method of calculating royalty depends on whether the oil shale is extracted by mining methods or processed by in-situ methods. The lessee is required to keep books showing lab analyses and daily data sheets with operational data to backup the royalty data. Royalty monies due the government must be submitted to the U. S. Geological Survey once a month by the lessee using standard Geological Survey forms. The royalty rate adjustment index factor used will be the latest one published. Corrections to the rate adjustment will be done on a yearly basis.

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